

## **REMARKS/ARGUMENTS**

Claims 1, 53 to 59, 61 to 91, 95, and 96 to 106 are now pending in this application. Applicant has herein amended claims 55, 57 to 59, 61 to 82, 84, 87 to 89, 91, and 95 for purposes of clarity and form. Claims 60, and 92 to 94 have been cancelled. New claims 96 to 106 have been added.

The Action has objected to claim 94 under 37 CFR 1.75 as being a substantial duplicate of claim 87. Applicant has cancelled claim 94, thereby rendering this objection moot.

The Action has rejected claims 58, 60 and 87, under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

The Action has set forth that regarding claim 58, it is not clear what the recitation "wherein the requisite amounts of specific mesh the activated charcoal" is stating (emphasis added). In this respect, claim 58 has been amended to clarify the claimed invention. The Action has set forth that regarding claim 60, the phrase "each charcoal bed" lacks antecedent basis, and it is not clear what is intended by "5.0+ 0.5 mm" (and that the Examiner will interpret this as "5.5mm"). Claim 60 has been cancelled, thereby rendering moot the rejection as to that claim. The Action has set forth that regarding claim 87, the phrase "the mainstream smoke solution" lacks antecedent basis. In this respect, claim 87 has been amended to clarify the claimed invention.

Pursuant to the foregoing, Applicant submits that claims 58 and 87 clearly point out and distinctly claim the subject matter that Applicant regards as the invention. Thus, reconsideration and withdrawal of the §112 rejections are respectfully requested.

Applicant notes with appreciation that the Action sets forth that claims 69 to 78 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. §112, second paragraph, and to include all of the limitations of the base claim and any intervening claims. However, Applicant submits that neither claims 69 to 78, nor base claim 1 have been rejected under 35 U.S.C. §112, second paragraph. Furthermore, for the reasons set forth below, Applicant believes that claim 1 is in condition for allowance and thus all claims which depend therefrom are also in condition for allowance.

Patentability Argument.

Applicant provides the following arguments establishing that the rejections under 35 U.S.C. §§102(b) and 103(a) should be withdrawn. The Examiner has rejected claims 1, and 79 to 95 under 35 U.S.C. §102(b) as being anticipated by Mentzel et al. (U.S. Patent No. 5,423,336). Additionally, the Action also sets forth that regarding claims 79 to 95, it would follow that the filter of Applicant's admitted art modified by Mentzel et al. would demonstrate the claimed functions and attributes. The Examiner has also rejected claims 1, 53 to 68, and 79 to 95 under 35 U.S.C. §103(a) as being unpatentable over Applicant's admitted art in view of Mentzel et al. Applicant submits that the claimed present invention is not anticipated by either Applicant's admitted art or Mentzel et al. Furthermore, Applicant submits that the claimed present invention is not unpatentable over Applicant's admitted art in view of Mentzel et al.

In part, claim 1 discloses a filter having specific mesh sizes of activated charcoal selected from the group consisting of: BS 44/52, BS 52/60, BS 60/72, BS 72/85, and any combinations thereof for effectively reducing p-benzosemiquinone. Applicant submits that Mentzel et al. makes no reference to p-BSQ and the effect of the Mentzel et al. ventilated filter cigarette on reduction levels of p-BSQ, nicotine, and tar delivery is absent in this reference. Additionally, as conceded by the Action, the charcoal used in the charcoal bed of the known charcoal filter cigarettes in the cited art does not have the claimed mesh sizes, which are necessary to attain the claimed benefit of the present

invention, i.e., reduced p-BSQ levels. Applicant respectfully submits that the cited art neither describes nor suggests all of the elements of the present invention. For the reasons already stated and for those outlined below, Applicant respectfully traverses the rejection on the grounds that (a) there is no teaching, suggestion or motivation in the cited art for the modification proposed by the Examiner, and (b) a combination of the cited art and Mentzel et al. patents, even if technically feasible, does not yield the invention as recited in the independent claim.

Applicant submits that the main difference between the filter of the claimed present invention and the ventilated filter cigarette of Mentzel et al. is in the construction of the cigarette filter and the objective of using a charcoal filter. Mentzel et al. describes a filter with an outer core impermeable to air and an inner core with a cross section of approximately half of an outer core and providing ventilation in a chamber containing the activated carbon, allowing secondary air to mix with the primary smoke. Applicant submits that the objective of using a carbon filter in Mentzel et al. was to remove an impurity from the smoke, and that without detailing the nature, toxicity, and hazardous effects of the impurity is ambiguous. With regard to the grain size and the amount of the charcoal used, Applicant submits that there is a gross difference between the Mentzel et al. device and the present invention. As declared by Indu Bhusan Chatterjee in the attached declaration under 37 C.F.R. 1.132, a comparative study was performed indicating the differences between the ventilated filter cigarette of Mentzel et al. and the claimed present invention. These differences are further discussed below.

The construction and configuration of the filter of the present invention is technically different than that of the ventilated filter cigarette of Mentzel et al. In contrast to Mentzel et al., the different portions of the filter of the present invention, namely, the first cellulose acetate fiber, the activated charcoal, and the second cellulose acetate fiber placed in between the activated charcoal and the tobacco are all constructed as one single unit with the three sections placed longitudinally one after another. The filter of the present invention does not have an outer casing impermeable to primary smoke,

and an inner duct for through-flow speed of primary smoke. In addition, it does not have ventilation openings in the middle chamber containing an activated carbon (adsorption agent).

The activated carbon used by Mentzel et al. has a grain size distribution corresponding to a screen mesh width in the range of 177  $\mu\text{m}$  to 500  $\mu\text{m}$ . The bed of activated carbon used is apparently a random mixture of non-specific amounts of different mesh sizes ranging between 177  $\mu\text{m}$  to 500  $\mu\text{m}$ . In contrast, the present invention uses different activated charcoal, having a mesh size as recited in claim 1.

As recited in the claims and in the specification of Mentzel et al., the use of an activated carbon filter is for the purpose of removing an impurity from cigarette smoke. Neither the nature or definition of the impurity, nor its toxicity or biologically hazardous nature is mentioned. Applicant submits that cigarette smoke contains approximately 4000 compounds, whereas Mentzel et al. relates ambiguously to the removal of an impurity. In contrast, Applicant submits that specifically among the 4000 compounds, p-benzosemiquinone (p-BSQ) is a major, highly reactive, toxic, biologically hazardous compound. P-BSQ causes oxidative damage to proteins and DNA, which may lead to mutation and cancer. The objective of the present invention is to use an activated charcoal of a specific mesh size to effectively reduce p-BSQ from the smoke. The meeting of this objective depends on the use of a charcoal bed having requisite mesh size of activated carbon particles. This specific mesh size of activated carbon particles also reduces other harmful components of the cigarette smoke, such as tar and nitric oxide. Oxidative damage of proteins and DNA is a function of the concentration of p-BSQ in the cigarette smoke. Reducing the p-BSQ content of the smoke by the use of specific charcoal filters effectively reduces the oxidative damage of proteins and DNA. As described, in part, on pages 19 and 22 of the specification, relevant experiments were conducted to test the efficacy of the filters on guinea pigs and the results were favorable. Mentzel et al. neither describes nor suggests a filter which is capable of reducing p-BSQ from smoke.

Mentzel et al. relates to a ventilated filter cigarette wherein the strand-side (the first chamber) achieves a high-pressure drop and low tar retention. As mentioned above, the cross-section of the air-impermeable sheath enclosing the filter section is about twice that of the inner core, so that the diameter of the inner core of the filter is reduced considerably. Therefore, the through-flow speed of the primary smoke is increased and the retention of tar is decreased. In contrast, the filter of the present invention does not have any ventilation allowing secondary air to enter into the filter bed, and it does not achieve any high-pressure drop. The filter of the present invention does not have an air-impermeable outer sheath, and there is no reduction of the inner core for achieving a high-pressure drop and low tar retention. It is well known that both tar and nicotine are harmful to smokers. Tables 1 and 2 show that the charcoal filter of the claimed present invention effectively reduces both the tar and nicotine content of the mainstream smoke.

In response to the assertions made by the Action, it is respectfully submitted that Applicant has clarified the claims to clearly recite the size of activated charcoal and its effect on the inhibition of p-BSQ. This important issue was not addressed by Mentzel et al. A person skilled in the art would not be encouraged to use the cited art to arrive at the claimed present invention, because nowhere does the cited art or Mentzel et al. refer to inhibition of p-BSQ, nitric oxide, or nicotine by taking into account size and amount of charcoal. In addition, there are no other cited references that can be combined together with the presently cited art to arrive at the claimed present invention.

The Office Action states, in part, that Applicant admits that typical charcoal filter cigarettes have a first conventional cellulose acetate fiber filter, acting as the mouthpiece, the length of which may vary according to convenience, e.g. 10-15 mm; a second conventional cellulose acetated fiber filter, acting as a barrier between a charcoal bed and a tobacco portion of the cigarette to prevent infiltration of charcoal into the tobacco, the length of which may be 2-4 mm; and a charcoal filter bed located

between the two conventional cellulose fiber filters, the length of the activated charcoal bed varying depending on the amount of charcoal used, e.g. 4.5-5.5 mm per 100 mg; or 9-11 mm per 200 mg; or 13-16 mm per 300 mg, etc. Applicant submits that the length of the mouthpiece cellulose acetate filter (10-15 mm) has practically no role in reducing the p-BSQ content of the mainstream smoke. It merely serves to hold the cigarette in the mouth. Similarly, the length of the cellulose acetate barrier has practically no role in reducing p-BSQ. Applicant further submits that the length of the activated charcoal bed varies depending on the weight and mesh size of the charcoal used. It cannot be fixed for different weight of different mesh sizes of the charcoal.

An obviousness rejection requires that a reference provide a teaching, suggestion or motivation for a proposed modification. The Mentzel et al. patent does not provide any teaching, suggestion or motivation to be modified for employment in a typical charcoal filter cigarette of the cited art. As such, the Mentzel et al. patent does not provide a sufficient basis for a section 103(a) rejection of claim 1. Additionally, for the reasons set forth above, even if the teachings of the cited art and Mentzel et al. patents were somehow combined, as attempted by the Examiner, the resulting combination would still be deficient in teaching or suggesting the claimed subject matter. Claim 1 is deemed to be patentable whether the Examiner's references are read individually or in combination.

Applicant submits that Mentzel et al. does not disclose all of the elements set forth in independent claim 1. Thus, Mentzel et al. does not anticipate claim 1. Furthermore, for the reasons set forth above, a person skilled in the art would not be encouraged to use the cited art in combination with or modified by Mentzel et al. to arrive at the claimed present invention. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the section 102(b) rejection of claim 1.

Furthermore, as set forth above, Applicant submits that the Mentzel et al. patent neither describes nor suggests all of the elements of the present invention. An

obviousness rejection requires that a reference provide a teaching, suggestion or motivation for a proposed modification. The Mentzel et al. patent does not provide any teaching, suggestion or motivation to be modified for employment in a typical charcoal filter cigarette of the cited art. As such, the Mentzel et al. patent does not provide a sufficient basis for a section 103(a) rejection of claim 1. Additionally, for the reasons set forth above, even if the teachings of the cited art and Mentzel et al. patents were somehow combined, as attempted by the Examiner, the resulting combination would still be deficient in teaching or suggesting the claimed subject matter. Claim 1 is deemed to be patentable whether the Examiner's references are read individually or in combination. It would only be hindsight reconstruction that would motivate one skilled in the art to modify the teaching of the admitted art to use the charcoal particles of the size, amount and attributes disclosed in the present application to perform the function of reducing p-BSQ. But for the teaching of the present application itself, one would not look to the Mentzel et al. patent to anticipate or make obvious that which is claimed in the present application. Applicant respectfully traverses the section 103(a) rejection on the grounds that (a) there is no teaching, suggestion or motivation in the admitted art for the modification proposed by the Examiner, and (b) a combination of the admitted art and the Mentzel et al. patent, even if technically feasible, does not yield the invention as recited in the independent claim. As such, the admitted art, taken alone or in combination with Mentzel et al., does not provide a sufficient basis for a section 103(a) rejection of the aforementioned claims. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the section 103(a) rejection of claim 1.

Claims 53 to 59, 61 to 91, and 95 depend from claim 1, so they are not anticipated by the admitted art, Mentzel et al., or any combination thereof, and also patentably distinguishable for at least the same reasons as discussed above with respect to claim 1. Additionally, the dependent claims discussed below are further distinguishable on their own merits.

The Office Action sets forth that regarding claims 59 to 68, it would have been obvious to one having ordinary skill in the art at the time of the invention, in an effort to achieve optimal adsorption of noxious cigarette smoke constituents, to arrive at the claimed activated charcoal size, after routine experimentation, since these charcoal grain sizes are envisioned by the applied prior art. Applicant submits that a filter using a random mixture of non-specific amounts of different mesh size of carbon particles ranging from 177 microns to 500 microns, as disclosed by Mentzel et al. is technically different, as supported by the attached Declaration, from the filter claimed in Applicant's patent application. The percent reduction of p-BSQ from the smoke depends on the use of a charcoal bed having requisite amounts of specific mesh size of the carbon particles, as shown in Table 1. Table 1 shows that whereas with 200 mg of BS 44/52 mesh size of carbon, the reduction of p-BSQ is only 55%, with 300 mg of 52/60 mesh size, it is 85%, and with a mixture of 100 mg of 60/72 and 100 mg of 72/85, the reduction is 78%. The technical difference between Mentzel et al. and the claimed present invention is that Mentzel et al. uses a charcoal bed having non-specific amounts of different mesh sizes ranging between 177 microns to 500 microns, whereas the claimed present invention uses different charcoal filters having in each case specific mesh sizes of carbon particles.

New independent claim 96 and new dependent claims 97 to 106 are not anticipated by Mentzel et al. or the admitted art, and are also patentably distinguishable over each, taken alone or in combination, for analogous reasons as discussed above with respect to claims 1, and 69 to 78. Furthermore, neither Mentzel et al. nor the admitted art, taken alone or in combination, discloses or suggests all of the elements of any of the new claims of the present invention.

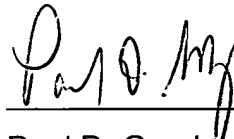
In view of the above remarks responsive to the subject Office Action, the Applicant believes that the rejections under 35 U.S.C. §§112, second paragraph, 102(b), and 103(a) should be withdrawn. The claims as currently presented distinguish from the art and represent patentable subject matter. Reconsideration and allowance,

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being in order, are earnestly solicited. Should there be further issues, the undersigned would welcome a telephone call to facilitate their resolution.

Respectfully submitted,

DATE: 9-21-04



Paul D. Greeley  
Attorney for Applicant  
Registration No. 31,019  
Ohlandt, Greeley, Ruggiero  
& Perle, LLP  
One Landmark Square, 10<sup>th</sup> Floor  
Stamford, CT 06901-2682  
Telephone (203) 327-4500  
Fax (203) 327-6401



IN THE U.S. PATENT AND TRADEMARK OFFICE

APPLICANT : CHATTERJEE, INDU BHUSAN

SERIAL NO.: 10/076041 GROUP : 1731

FILED : February 13, 2002 EXAMINER :Dionne A. Walls

FOR : **ACTIVATED CHARCOAL FILTER FOR EFFECTIVELY  
REDUCING P-BENZOSEMIQUINONE FROM THE  
MAINSTREAM CIGARETTE SMOKE**

**DECLARATION REGARDING CO-RELATION BETWEEN AMOUNT AND  
MESH SIZE OF ACTIVATED CHARCOAL IN A CIGARETTE FILTER TO  
REDUCE P-BENZOSEMIQUINONE**

Honorable Commissioner of Patents  
Washington, D.C. 20231

Sir,

I CHATTERJEE, INDU BHUSAN, am the inventor of the above-stated patent application.

I hereby declare that

I am a post-doctorate/doctorate/scientist in the field of Biochemistry. I completed my doctorate from Calcutta University in the year 1960. Right now, I am pursuing my research work in the field of Biochemistry since the year 1953.

I have worked with institute from year 1964 to till date. Also, I worked with UCLA, USA from year 1961 to 1964.

My area of expertise is vitamin C and oxidative damages. I have more than 80 publications in this field. Also, I have won several awards like *Amulyaratan* Prize, Calcutta University, Platinum Jubilee Lecturer of Indina Science Congress, Fellow of Indian National Science Academy etc.

The institute, Dr. B. C. Guha Centre for Generic Engineering and Biotechnology, Calcutta, India is an extremely reputed institute in the country/world, which specializes in the field of Biochemistry and Life Science. The institute was established in the year 1991. The institute has infrastructure to conduct several complex and high technological experiments.

In the above-stated patent Application filed at USPTO, I have worked comprehensively on activated charcoal filter for effectively reducing p-benzosemiquinone from the mainstream cigarette smoke. There are a few technical differences with respect to the cited art, which makes my work novel and inventive. I herebelow provide a comparative study indicating difference between the disclosure made by Mentzel *et al.* and our work in the present invention.

◇ **Construction of cigarette filter**

Disclosure by Mentzel *et al.*

The disclosure relates to a ventilated filter cigarette having three chambers, the first chamber adjoining the tobacco strand, a middle chamber filled with an absorption agent, preferably activated carbon, and a third chamber as the mouth side chamber. The whole filter section has a core and a casing enclosing the core. The core is permeable for primary smoke and the casing is virtually impermeable for the primary smoke. The cross-sectional area of the core or duct is generally less than about half of the total cross-sectional area of the filter tip. The cross-sectional area of the casing, which is impermeable to primary smoke, is more than half of the filter tip. The middle chamber containing the activated carbon is provided with ventilation openings allowing secondary air to enter the middle chamber or by using porous paper. The secondary air entering the middle chamber through ventilation openings is mixed there with the primary smoke and then leaves through the mouth-side chamber.

Our observation

In contrast to Mentzel *et al.* the construction of the cigarette filter disclosed by us is simple. The different portions of the filter, namely, the cellulose acetate mouth piece, the charcoal filter, the thin cellulose acetate filter placed in between the charcoal and the tobacco portion and the tobacco portion are all constructed into one single unit. It does not have an outer casing impermeable to primary smoke, and inner duct for through – flow speed of primary smoke. In addition, it does not have ventilation openings in the middle chamber containing activated charcoal. So, the cigarette filter disclosed by us is technically different from that of Mentzel *et al.*

◇ **The use of activated carbon**

Disclosure by Mentzel *et al.*

The activated charcoal used has a grain size distribution corresponding to a screen mesh width in the range of 177  $\mu\text{m}$  to 500  $\mu\text{m}$ . The bed of activated charcoal used is apparently a random mixture of non-specific amounts of different mesh sizes ranging between 177  $\mu\text{m}$  to 500  $\mu\text{m}$ .

Our observation

We have used different charcoal filter having in each case specific amounts of specific mesh size of carbon particles, such as 0.2 g of mesh BS44/52, 0.2 g of BS 52/60, 0.3 g of BS 52/60, 0.2 g of BS 60/72, 0.2 g of BS 72/85 etc., as indicated in Table 1 of the specification.

◇ **Objective of the use of activated charcoal**

Disclosure by Mentzel *et al.*

The object of Mentzel *et al.*, for the use of activated charcoal filter is to remove an *impurity* from cigarette smoke. The nature of the *impurity*, its toxicity or biological hazardous nature is not mentioned.

Our comments on the above disclosure:

Cigarette smoke contains about 4000 compounds, whereas the disclosure by Mentzel *et al.* relates to removal of *impurity*. Obviously, the disclosure relative to removal of an *impurity* out of said 4000 compounds seems to be ambiguous.

Our invention:

Cigarette smoke contains about 4000 compounds (Ref. World Cancer Report, WHO, 2003, Eds Stewart, B. W. and Kleihues, P., IARC Press, p. 27). We have observed that among the 4000 compounds, p-benzosemiquinone (p-BSQ) is a major, highly reactive, toxic, biologically hazardous compound. P-BSQ causes oxidative damage to proteins and DNA, the critical biological molecules, which may lead to mutation and cancer. The objective of our invention is to use activated charcoal filter for effectively reducing p-BSQ from the mainstream smoke depends on the use of a charcoal bed having requisite amounts of specific mesh size of carbon particles. the said device of the requisite

amounts of specific mesh size of carbon particles also reduce other harmful components of the cigarette smoke such as tar and nitric oxide. Oxidative damage of proteins and DNA is a function of the concentration of p-BSQ in the cigarette smoke. Reducing the p-BSQ content of the smoke by the use of specific charcoal filters effectively reduces the oxidative damage of proteins and DNA. Relevant experiments were conducted to test the efficacy of the said filters on guinea pigs and the results obtained were favorable.

◇ **Removal of tar**

Disclosure by Mentzel *et al.*

The disclosure of Mentzel *et al.* relates to a ventilated filter cigarette wherein the strand-side (the first chamber) achieves a high-pressure drop and low tar retention. As already mentioned (construction of the cigarette filter), the cross section of the air-impermeable sheath enclosing the filter section is about twice that of the inner core, so that the diameter of thinner core of the filter is reduced considerably. Therefore, the through-flow speed of the primary smoke is increased and retention of tar is decreased.

Our invention

The cigarette filter disclosed by us does not have any ventilation allowing secondary air to enter into the filter bed and it does not achieve any high pressure drop. In the filter disclosed by us, there is no air-impermeable outer sheath and there is no question of reduction of the inner core for achieving a high-pressure drop and low tar retention. It is well known that both the tar and nicotine are harmful to smokers. Tables 1 and 2 shows that charcoal filter disclosed by us effectively reduce both the tar content and nicotine of the mainstream smoke.

◇ **Mixing of specific aromatic substances**

Disclosure by Mentzel *et al.*

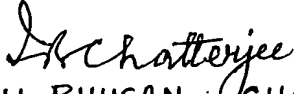
The disclosure of Mentzel *et al.* relates to the addition of specific aromatic substances on to the filter material in order to eliminated unwanted adverse effects on taste.

Our invention

No addition of aromatic substances was made on to the filter.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardise the validity of the application or any patent issued thereon.

Date: July 22, 2004

  
INDU BHUSAN CHATTERJEE  
KOLKATA, INDIA

BY: (name, place, and signatures of the inventor)